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SPECIFIERS' GUIDE

LIGHT GAUGE STEEL FRAMING SYSTEMS (SFS) EXTERNAL WALL SYSTEMS

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SPECIFIERS' GUIDE SCI P433
LIGHT GAUGE STEEL FRAMING SYSTEMS (SFS) EXTERNAL WALL SYSTEMS

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David Atkinson voestalpine Metsec

Mandeep Bansal Knauf

Joe Cilia FIS

Chris Greve CCF

Stephen Hall Construction Metal Forming

Kate Hawkins Stanmore

Chris Holleron voestalpine Metsec

Charles Johnston Knauf

Colin Kennedy Veitchi Interiors

Daryl Lewis Protektor UK

James Smith NBS

John Taylor SIG

Andrew Way Steel Construction Institute (SCI)

This guide is a joint publication from:

FIS (Finishes and Interiors Sector Ltd)
The not-for-profit representative body for the £10bn finishes and interiors sector in the UK. The organisation exists to support its members, improve safety, minimise risk, enhance productivity and drive innovation in the sector.

SCI (Steel Construction Institute)
A trusted, independent source of information and engineering expertise globally for more than 30 years. SCI remains the leading, independent provider of technical expertise and disseminator of best practice to the steel construction sector.

FOREWORD

Specifying infill SFS requires considerable thought and design, even before a specification can be written. This is because the specification is a living document that should be developed alongside the engineering design rather than a simple output from a list of attributes and parameters, to cover the three light steel external wall systems and the five current variants of SFS.

This guide, written by industry, pulls together decades of experience for you from specification managers who almost instinctively know the questions on all aspects – from performance, material characteristics, sustainability and environmental to conformity marking, installation, maintenance and end of life.

It includes 23 questions relating to 'critical building information', a further 15 questions to check that they are all addressed, a list of ten questions on risk and how to avoid them and a further ten questions on writing a smart specification to ensure a safe, compliant and complete specification can be written.

All of which is crucial to ensure that the specification is not open to misinterpretation, and that any alternatives can be assessed and checked as equal, before approving them.

There has never been a time in construction when specification has been more important. This specification guide sets out our desire to help everyone involved in the specification of products and systems and our commitment to raise the safety of residents, occupiers and those who use the built environment.

COLIN KENNEDY, CHAIR,
FIS SFS WORKING GROUP

FIS is the trade body representing manufacturers, suppliers and installers in the fit-out sector, including steel framed systems (SFS). The Steel Framed Systems Working Group is an inclusive body with the following objectives:

- Develop technical standards as required
- Promote best practice in the market
- Educate and inform clients and specifiers about (working group) work
- Promote the products and skills of FIS members in this field
- Monitor and support risk on behalf of the community
- Shape the market so that the correct adherence to standards is recognised and adhered to by all, to the benefit of clients.

FOREWORD

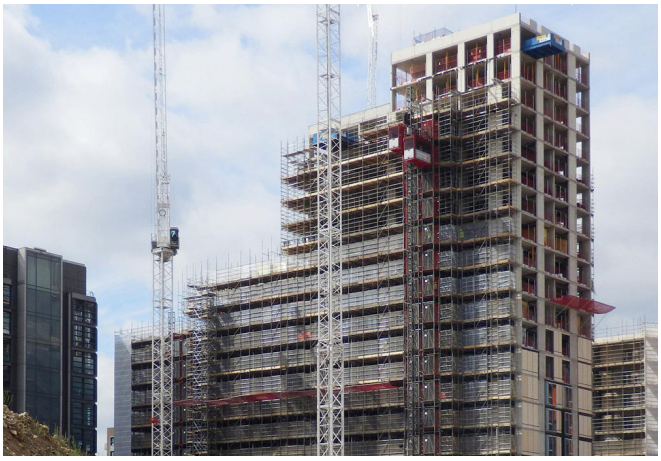
The correct specification is vital for the delivery of suitable products and systems, and steel frame infill wall systems are no exception. In order to achieve the correct specification, a considerable amount of information is required about the intended use of the product and the desired performance characteristics.

The purpose of this guide is to explain the specification process required for steel frame infill wall systems and the types of questions that need to be asked and answered to achieve the correct specification. The guide has been produced with valuable input from different sectors of the construction industry and coordinated by FIS to create a useful publication for all. The guide should prove to be beneficial to the steel frame infill wall sector to ensure that the steps to achieving a complete specification are not underestimated.

ANDREW WAY, ASSOCIATE DIRECTOR,
SCI (STEEL CONSTRUCTION INSTITUTE)

"The guide should prove to be beneficial to the steel frame infill wall sector to ensure that the steps to achieving a complete specification are not underestimated."

INTRODUCTION



The specification document is key to ensuring that what is constructed meets the client's requirements and, importantly, the Building Regulations.

It is used in the tender process to invite bids and during the construction phase to ensure that relevant standards are being met and products supplied are as specified.

After occupation, it forms a cornerstone of the operation and maintenance manual (O&M), so the importance of a specification cannot be understated.

This guide has been written by specialists who are involved in writing these specifications on a regular basis. It will give you insights into questions that you may not have encountered before. And if you are new to the process, it will provide you with a framework to understand the detail that needs to be considered to write a smart specification.

SCOPE

This specifiers guide has been produced to assist the process required to specify infill SFS. This document is based on current Building Regulations at the time of writing in England (March 2021).

Who will use this guide? As it is a shared responsibility, this guide is for everyone:

- Architects
- Specifiers
- Designers
- Engineers
- Consultant.

CONTENTS

DESIGN PROCESS

A specification for SFS can only be written when a full structural design has been produced.

This guide will provide you with a process and outline the key information requirements for the design to be produced and a specification to be written.

These requirements may vary from building to building, so specialist system manufacturers should be engaged as early as possible during the design process to ensure a fully compliant specification can be produced.

RESPONSIBILITY

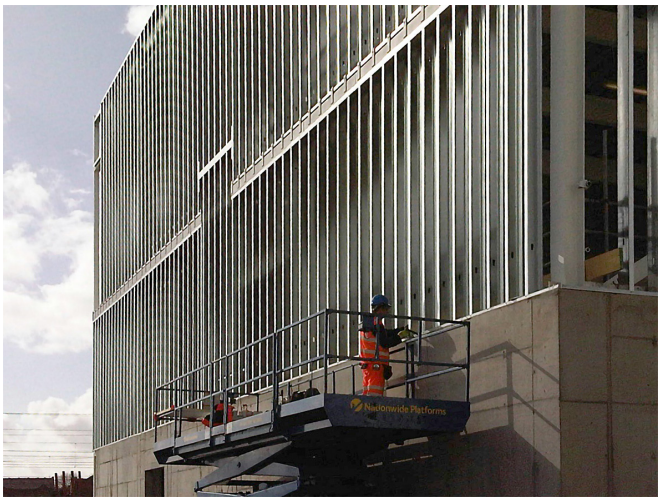
It is the responsibility of the designer under the Construction (Design and Management) Regulations 2015 (CDM) to ensure that the building can be constructed safely, and that the specification meets the requirements of the Building Regulations.

PRODUCT

Light steel external wall systems are used extensively on a range of building types and are an economic and efficient method of providing façade walls for steel and concrete framed buildings.

There are three generic types of light steel external wall system:

- Infill
- Continuous (oversail) walling
- Panelised.



Continuous (oversail) wall

Infill SFS

Panelised system

Light steel external walling systems made up of steel frame internal lining plasterboard, external sheathing board and internal/external sheathing insulation are capable of resisting wind loads, providing fire protection, thermal and acoustic performance and supporting a range of façade materials.

SYSTEMS/PRODUCTS

Systems are a collection of individual construction materials (steel framing sections, boards, fixings) which, when tested together, form systems.

Systems should be capable of meeting the regulatory and performance requirements published in the manufacturer's data and have test evidence to substantiate the claims.

DEFINITIONS

- Infill walls (stick-built, on-site)
- Continuous (oversail) walls (stick-built, on-site)
- Panelised systems (prefabricated, often with sheathing board attached)

Considered variants of standard exterior walls are:

- Faceted to achieve curved walls
- Ribbon windows
- Parapets and down stands
- Braced walls (in the same line as the infill walling)
- Inclined walls and soffits
- Balconies and patio walls.

INFILL WALLING

Infill walling is constructed from the structural floor to soffit of the primary structural frame to 'infill' the external wall zone. A base track is fixed onto the floor slab of the primary structural frame. Typically, slotted head tracks are then fixed to the underside of the slab or structure to allow for deflection (axial movement), and studs are then cut, aligned and fixed into position with Tek screws at the required centres to provide support for internal and external finishes.

Facetted external

Parapet

Infill walling

SFS base construction

The framework is usually positioned within the confines of the structure. In some cases, however, the panels may be constructed such that they project past the edge of the primary structure to a nominal overhang, by cantilevering or using brackets or supplementary framework.

Typically, these systems are 200-400mm thick, including the lining boards and external insulation.

CONTINUOUS (OVERSAIL) WALLING

This system oversails the edge of the primary structure. Studs sail past the slab edge to maximise floor area, which also means cladding does not need to bridge deflection joints at each floor.

Support is required for the systems base track using either a solid fixed cleat or direct bearing onto the supporting base structure. Studs are then built multiple storeys tall, typically three floors. These are restrained using cleats with slotted connections at each slab level. Each lift of studs is spliced or capped with a track, which provides support for the next base track and lift of studs over.

Typically, these systems are 200-400mm thick including the lining boards and external insulation.

PANELISED SYSTEMS

The panelised system uses prefabricated light steel wall panels, which can be supplied with insulation and boards attached off-site. These can be craned into position or manually handled (depending on size and weight) via hoists and fixed to the primary structural frame.

Typically, these systems are 200-300mm thick including the lining boards and external insulation.

The position and interface of cavity barriers should be designed in collaboration with a facade detail and the SFS systems provider.

FAÇADE MATERIALS

Façade materials are used to define the building and can include steel, aluminium, aluminium cladding material (ACM), glass reinforced concrete (GRC), stone and brick.

The selection of the façade will affect the design of the SFS.

SFS systems are typically installed with studs at 600mm centres to suit standard boarding sizes. As such, brick ties should be arranged to suit this spacing, whilst maintaining the required tie density using BS EN 1996-1-1 Eurocode 6. Design of masonry structures. General rules for reinforced and unreinforced masonry structures. Note: this may require additional studs.

CRITICAL BUILDING INFORMATION REQUIREMENTS

This section includes guidance on the information that will be required by the manufacturers to address design issues that are specific to light steel external walling.

Generic structural design guidance for light steel sections is provided in SCI publications P276, ED005, ED017 and P424.

DESIGN STAGE

Manufacturers of SFS systems often start by providing an initial request for information (RFI) when they engage with the specifiers.

Typically, this information includes:

- Location of the building
- Height of the building and its relationship to surrounding buildings
- Structural framework of the building
- Deflection limits of the applied finishes
- Live load deflection tolerances
- Structural movement (floor deflections, inter-storey drift)
- Construction tolerances of the structure
- Fire performance requirements of the system
- Elevation treatment (cladding)
- Insulation treatment
- Loads (dead and live loads)
- Windows and opening sizes
- External features (such as balconies and porticoes)
- Environmental conditions (wind, humidity, salt, air).

LOADS

Information about potential loads will be required as early as possible in the design process, including:

- Wind
- Façades
- Doors and windows
- Features
- External wall insulation (EWI)
- Internal linings
- Internal fittings
- Barriers and handrails
- Balconies and porticoes.

However, the weight of the wall system and the cladding that it supports should also be considered in the design, especially for lintel sections.

WIND LOADS

SCI ED017 will provide more guidance on wind load calculations.

DEAD LOADS

The dead load is the weight of the external wall system and the cladding system that it supports.

DEFLECTIONS

Building movement under live load and wind load needs to be calculated by the structural engineer This information should be given to the manufacturer to ensure that the system will accommodate any deflection requirements.

OPENINGS

Openings in external wall panels are required at window and door locations. Additional members are required to frame around openings: jambs either side of the opening; a lintel above the opening; and a cill below the opening. Additional hot rolled steel sections may be required around larger openings such as ribbon windows and bay doors.

Reinforced cill brackets to take point loads

PERFORMANCE

External SFS systems should have test evidence to demonstrate their performance to meet Building Regulations for:

- Structure
- Fire
- Thermal
- Acoustics.

CRITICAL BUILDING INFORMATION REQUIREMENTS

Ribbon windows

They should also meet the specific criteria as required by the project, such as:

- National House Building Council (NHBC)
- Local Authority Building Control (LABC) Premier Guarantee
- SER Scotland - Structural Engineers Registration Ltd
- The building owner
- Insurance companies.

Additional tests for water penetration and Secured by Design should be considered.

SECURED BY DESIGN HOMES 2019

Where the SFS system is being installed using 'secure door set' guidance in Approved Document Q (AD Q), the Secured by Design Homes 2019 guidance should be followed.

Specifiers and Designing Out Crime Officers are advised that the correct installation of lightweight framed walling systems is crucial to the level of security ultimately provided. It is therefore recommended that they are installed by approved installers who have received appropriate training.

An additional option is the installation of 9mm (min) timber sheathing or expanded metal in the areas concerned.

securedbydesign.com/images/downloads/HOMES_BROCHURE_2019_update_May.pdf

THROUGH THE WALL

'Through the wall' is often described as the composite build-up of the external wall of a building using internal plasterboard lining, light gauge steel frame, internal insulation, external sheathing board and external sheathing insulation, which when constructed together provide the primary fire resistance and weathertightness of the wall.

Structural, fire, thermal and acoustic requirements will define the required performance for elements and products specified in the wall construction.

The final choice of cladding must be considered during the design stage to ensure the SFS is designed to support the load and evidence of compliance for this whole assembly should be sourced before the final specification is written.

EXTERNAL FEATURES

The façade of a building may include external features such as porticoes and balconies.

Balconies

The specification of the external walling system should consider the external features of the building, particularly their structural design and method of support.

External features may be supported from the ground and attached to the building for lateral restraint, or they may be supported from the primary structural frame of the building. In some situations, if the external features are lightweight, they may be supported from the external walling system.

The thermal performance of connections to or through the external walling system should be considered in the specification.

CLADDING

Design consideration and coordination between the façade finishes and external wall should be considered at an early stage of design development.

The building's location and performance and the aesthetics of the façade finishes will all have an impact on the external wall design. Engaging with SFS manufacturers early will enable design teams to ensure vital coordination considerations are reviewed and accounted for.

Height of buildings and locations should be considered for wind loading and wind tunnelling.

Information should be reviewed with engineers and established early to ensure correct specifications can be created for schemes.

Deflection and movement requirements identified for the external wall should be carried through to external finishes. Such consideration will need to focus on cladding joint lines and subframe fixing positions to ensure the performance of the external wall is not affected.

Loadings of cladding and mixed façade finishes should be reviewed with external wall specifications, as these can have an impact on the depth and gauge of walls, to ensure the cladding can be sufficiently supported.

The project engineers should consult the manufacturers where certain façade systems have deadload points direct to structure rather the external wall framing.

Traditional façade finishes, such as hand-laid brickwork, should be reviewed with project engineers to establish the brickwork tie channel setting out criteria. It is vital to coordinate channel fixing positions and stud locations – especially around window openings, where a general offset up to 250mm can be applied depending on finishes and setting out requirements.

Note: for further guidance, refer to the Centre for Window and Cladding Technology (CWCT).
cwct.co.uk/pages/publications

SERVICES PENETRATIONS

Services penetrations in fire-resisting elements should be designed to ensure that all penetrations and penetration seals meet the requirements of the Building Regulations.

The ASFP, BESA, BSRIA, FIS and GPDA document Firestopping of Service Penetrations: Best Practice in Design and Installation provides more information.
thefis.org/membership-hub/publications/best-practice-guides/firestopping-of-service-penetrations/

ENVIRONMENTAL/ SUSTAINABILITY REQUIREMENTS

The design and specification should reflect the environmental and sustainability requirements from the client's brief.

These may include:

- Passive House
- BREEAM
- LEED
- SKA rating.

CONDENSATION

Condensation is a risk in the void and internally where cold spots can occur.

Thermal calculations should be produced at the design stage with the insulation suppliers, and a risk assessment should be carried out to establish that the dew point is out of the SFS Framework (including any cold bridging).

Where the SFS is to be installed below ground – for example, to form a basement – the following information will be required to design the SFS to meet the required thermal performance:

- Floor area (m^2)
- Floor perimeter (m)
- Thickness of basement wall (mm)
- Depth of basement floor below ground level (m)
- Overall build-up (including materials, densities and dimensions)
- Target U-value (W/m^2K).

PERFORMANCE

The performance requirements for infill SFS can be broken into the following headings:

- Fire
- Acoustics
- Thermal..

FIRE

REACTION TO FIRE

Reaction to fire is the measurement of a material's contribution to the development and spread of fire, generation of smoke and the production of flaming droplets – all major factors in the rate of development of a fire and the effect on people and property.

Reaction to fire is classified under BS EN 13501 -1 and tested using the tests listed below.

The current required material classifications are shown in Approved Document B of the Building Regulations (England).

The minimum classification needed in most tall commercial applications is A2- s1, d0.

FIRE RESISTANCE

Fire resistance is a system's ability to resist the passage of fire from one area to another. Fire resistance is shown in the test report as minutes – REI 30 (30 minutes), REI 60 (60 minutes) etc. This refers to the ability of the whole construction to satisfy the structural stability (R), integrity (E) and insulation (I), when tested to BS EN 13501-2.

Although Infill SFS systems are not designed to carry any load from the structure, there may be instances in some continuous (oversail) walling systems where structural stability (R) test evidence is required.

Any deflection between the floors should be accommodated in specifically designed deflection heads.

The direction of fire resistance needed (out to in/ in to out or both) should be established, as walls are not symmetrical and may perform differently according to direction of exposure.

Where SFS is installed onto intumescent coated steelwork, it should be raised by use of zed bars or similar ancillary components. The gap created should be a minimum of 50 times the intumescent coating thickness and typically gaps of between 40mm and 50mm are provided. The required gap should be provided to the SFS designer and specified by the coating supplier/designer.

COMPARTMENTATION

Compartmentation is a requirement dependant on the proximity of adjoining and adjacent buildings.

The compartmentation should be considered as a whole – in other words, the system.

ACOUSTICS

The sound performance of the SFS system is determined by the site requirements from noise mapping and the client's requirements.

Manufacturers can provide test evidence from laboratory tests and calculations to allow acousticians to help select the correct system.

THERMAL

The U-value should be established for the façade as a whole and will depend on the insulation materials as well as the openings in the SFS.

DESIGN WORKING LIFE

SFS designs are usually specified and engineered for a design working life of either 50 years (BS EN 1990 Category 4) or 60 years (British Standards/ NHBC). Note that the durability of SFS systems is such that they readily surpass these timescales.

PERFORMANCE DATA

Manufacturers who have test evidence for their systems are encouraged to publish their performance using the template on page 14.

PERFORMANCE

Performance data template

MANUFACTURER			PRODUCT NAME		REFERENCE	
			Specification requirement			
Parameter	Value	Standard	Regulation	Other	Test report number	Assessment report number and expiry
Acoustics	D_{nfw} R_w	**Attenuation** (sound insulation) BS EN 140-3 BS EN 717-1 BS EN 1084-2	Building Regulation AD E	LEED, SKA Rating, BREEAM, Well Building standard		
Fire		**Reaction to Fire** EN13501-1	Approved Document B CPR CE marking LPCB – Red Book	BS 9999 BS 9991		
	In minutes **R** Resistance / load bearing capacity **E** Integrity **I** insulation	**Resistance to fire** BS 476-22 BS EN 1364-1 BS 476-21 BSEN 1365-1	Approved Document B CPR CE marking LPCB – Red Book	BS 9999 BS 9991		
Sustainability		Environmental Product Declaration (EPD) ISO 14025 BS EN 15804	LEED, SKA Rating, BREEAM, Well Building standard			
Recycled content		Environmental Product Declaration (EPD) ISO 14025 BS EN 15804	LEED, SKA Rating, BREEAM, Well Building standard			
Air permeability	Class 1-12	ISO 14644:1	Would appear in NBS/ Euro codes AD L			
Corrosion LGS frame Brackets	Rating C1, 2, 3, 4, 5	BS EN ISO 14713-1 BS EN 1090-1	Would appear in NBS K10/G10			
Thermal conductivity	(W/Mk) PSI value	BS EN 12664 BS EN 12667 BS EN 12939	Building Approved document L			
Wind loading		Individual engineered solution BS EN 1991-1-4 BS 6399-2	Would appear in NBS			
Tolerances		BS EN 1090-4 SCI/ FIS ED 017	Would appear in NBS/ CPR CE marking			

UKCA CONFORMITY MARKING

Where a designated standard exists for a product, this places obligations on manufacturers, distributors and importers (known collectively as 'economic operators') for that product when it is placed on the market in the UK. The product must have a declaration of performance and have been affixed with a UK Conformity Assessed (UKCA) marking or a UK Conformity Assessed Northern Ireland (UKNI) when placed on the market in Northern Ireland (where the materials originate in the UK).

gov.uk/guidance/using-the-ukca-marking
gov.uk/guidance/using-the-ukni-marking

The following components require conformity marking.

To improve transparency in terms of product performance, CE-marked construction products are covered by a Declaration of Performance (DOP) to enable customers and users to easily compare performance of products available in the European market.

- Light gauge steel framework is covered by BS EN 1090-4
- Gypsum plasterboards. Definitions, requirements, and test methods. BS EN 520:2004+A1:2009
- Gypsum boards with fibrous reinforcement. BS EN 15283:2008
- Gypsum lining boards BS EN 14190:2014
- Anchors in concrete are covered by EAD 330232-00-0601 Mechanical fasteners for use in concrete
- Sheathing boards are covered by EN 13986:2004-10
- Cement particle boards are covered by BS EN 13986:2004+A1:2015
- Fibre cement boards is EN 12467
- Brackets are covered by BS EN 1090-2/4.

MgO BOARDS

Some insurance and warranty companies are providing guidance on the use of magnesium oxide boards (MgO).

Ensure that the warranty companies are involved in approving the specification, adopting PAS 670 magnesium oxide-based boards for use in buildings.

Cement boards on stick-built infill

THIRD-PARTY CERTIFICATION

Certification means that an independent organisation has reviewed the process of manufacturing or installing a product for a specific application.

It has been independently determined that the final product or installation complies with safety, quality and performance standards.

EXECUTION CLASSES

SFS systems are designed to carry a variety of load combinations and are therefore considered structural. Consequently, SFS systems must be manufactured and installed to an appropriate standard.

Cold-formed steel components used within SFS systems are produced in accordance with BS EN 1090-4. This standard provides the technical requirements to achieve Execution Class 3 (EXC3), suitable for all but the highest risk structures.

SFS systems are designed to contribute to the strength and stability of the external façade only, and do not contribute to the overall strength and stability of the superstructure. As such, SFS can be categorised as Structural Class II in accordance with BS EN 1993-1-3. SCI document P402 advises that the technical requirements of BS EN 1090-4 are sufficient for the execution of structural class II elements.

SPECIFICATION

SPECIFICATION

spɛsɪfɪˈkeɪʃ(ə)n

Noun: specification; plural noun: specifications

1. an act of identifying something precisely or of stating a precise requirement

"give a full specification of the job advertised"

2. a detailed description of the design and materials used to make something

These are key points to writing a smart specification, no matter if it's SFS, a ceiling, a partition, a floor or anything else in the finishes and interiors sector that you are planning to specify.

On your next project, don't be tempted to cut and paste from the last project; take a fresh look and see for yourself the benefits of this simple guidance.

TOP TIPS TO SPECIFYING SFS EXTERNAL WALL SYSTEMS

These are the key points that we think will help you write a smart specification:

1 TALK TO THE MANUFACTURER

Manufacturers have the expertise, competency and relevant test evidence to interpret your designs and find the most cost-effective solution to meet all aspects of the brief. They can also help develop solutions to meet specific requirements.

2 PERFORMANCE IS KING

Performance is probably the most important aspect of a specification (fire, sound etc). Performance is key to getting a smart specification. A product may look great and be under budget, yet it will be useless if it can't perform in the way you want.

It is important that you convey the performance requirement unambiguously, stating what standard the product should have been tested to and specifying systems rather than individual products that may not have been tested together.

Building Regulations Approved Document B states people who are responsible for building work (eg agent, designer, builder or installer) must ensure that the work complies with all applicable requirements of the Building Regulations.

3 CONSIDER THE INTERFACE WITH OTHER ELEMENTS AND JUNCTIONS

It has been said that the edge is the most important element of a construction project, which means interaction and interface are crucial, as well as tolerances between abutting elements. In particular how the SFS will be fixed to any fire protected steel work and how intersecting drylining will interface with the sfs to ensure the sound and fire performance of the drylining will be maintained.

4 UNDERSTAND THE REQUIREMENTS

Apart from performance, it is important to understand what the light gauge steel framing is required to carry – internal and external finishes, wind load and deflection – as well as its performance requirements.

5 UNDERSTAND THE BUDGET

Budgets will vary greatly from project to project depending on the performance levels required on the installation in question. Specifiers can make their budget work harder for them by speaking to manufacturers , specialist contractors and suppliers, who should be able to suggest where cost savings can be made without compromising the result. Note: the designer is responsible for the design and must approve any suggestions as the contractor cannot be held liable.

6 UNDERSTAND THE PROGRAMME AND SITE CONDITIONS

Although careful planning and budgeting can account for most things, the availability of the selected system and the site conditions during installation can hold up the completion of the project and have an impact on the final finishes.

7 UNDERSTAND THE VISION AND CLIENT ASPIRATIONS

The client's aspirations and expectations should be explored and confirmed early, by stage two in the digital plan of work, and a realistic cost plan prepared to meet this.

8 ENSURE THE PERFORMANCE AND WORKMANSHIP REQUIREMENTS AND STANDARDS ARE CLEARLY INCLUDED

Specifying a product is only halfway there if you don't state the standard of workmanship and quality expected at handover, particularly where you are specifying finishes.

A number of British standards refer to workmanship on site in the BS 8000 series, and we always recommend asking for a benchmark against which the completed work can be measured.

9 UNDERSTAND THE IMPLICATIONS OF MAINTENANCE

Gaining access to voids for inspections or to maintain cavity barriers should be included where required in the specification.

10 UNDERSTAND THE ENVIRONMENTAL IMPLICATIONS AND WHAT WILL HAPPEN AT END OF LIFE

Specification considerations may in some cases be steered by the company's CSR or environmental policy statement. As a result, the need to meet these requirements can result in a specific solution being needed – meeting a good BREEAM or SKA Rating, for example, can have an impact on the initial specification process.

11 DO NOT BE SCARED OF SPECIFYING NEW PRODUCTS; THAT'S HOW NEW PRODUCTS ARE DEVELOPED

Remember products must be equal and approved not similar or approved. Remember that the person specifying a performance product to meet the requirements of the Building Regulations is responsible for ensuring they comply. So any alternative should be equal and should be approved by the specifier.

ISSUES TO BE CONSIDERED

BUILDING REGULATIONS

All Building Regulations in place at the time that planning is applied for should be considered during the design and specification process.

Contractual conditions may ask for additional considerations.

Note that healthcare, education and Ministry of Justice (MOJ) may have separate requirements.

STRUCTURAL DESIGN

The following should be checked:

- SFS sections, internal lining boards, sheathing boars, insulation, fixings are conformity marked
  Note: conformity marking does not imply that products can be mixed
- Calculations are provided and signed off by a competent structural engineer and reviewed by the project structural engineer and signed off by the architect
- Interfaces and fixings to primary structure are considered and shown on drawings
- CDM requirements are met
- The chosen SFS supplier can offer professional indemnity
- The SFS meets the relevant requirements of corrosion protection – for example, at ground level, flat roofs, terrace and balconies.

FIRE DESIGN

The designer should request the following information from the supplier:

- The chosen SFS supplier can offer 'through wall' construction and has appropriate fire resistance test or assessment in lieu of tests as substantiation from test data from an independently certified and registered facility
- Requirements for fixing the components to match the fire test/assessment are understood and followed on site
- Interfaces of the SFS and primary structure are considered and detailed, including the need for fire barriers in cavities and interfaces
- If the primary structure is steelwork, then connections to intumescent painted steels or boxing out should be detailed.

WRITING A SPECIFICATION

In order to provide a clear and unambiguous statement of what is required, a specification should be produced by the designer or specifier, ideally with assistance from the manufacture or systems owner.

WHAT IS A SPECIFICATION?

A specification is a detailed description of the dimensions, construction, workmanship, materials etc of work done or to be done on a project, prepared by an architect, engineer or designer, often referred to as specifiers.

thenbs.com/knowledge/what-are-architectural-specifications

WHAT'S INCLUDED AND WHAT'S NOT INCLUDED?

Populated by the specifier, a specification document describes in words what cannot be visualised or explained on a drawing or model. This document can be incredibly wide-ranging, covering the establishment of the site, the type of contract to be used, the performance criteria of the asset, the quality of the systems and products, which standards are applicable and how they should be executed, and even the products to be used.

Specifications do not include information on cost, product availability, quantity or drawn/visualised information, so need to be read in conjunction with documents detailing quantities, schedules and drawings. For this reason, if and should a product be unavailable and a substitution be required, the specification document should be adhered to when choosing an alternative.

WHAT ARE THE TYPES AND ADVANTAGES OF WRITING A SPECIFICATION?

A very prescriptive specification at tender stage will ensure the client has a high degree of certainty about what will be delivered.

A performance specification gives suppliers more discretion – for example, to suggest innovative solutions and/or to act as a design brief for specialist subcontractors.

A specification is a document that describes in words what cannot be visualised or explained on a drawing or model.

HOW SHOULD SPECIFICATIONS BE STRUCTURED?

The structuring of specifications will vary from project to project but should reflect the work packages on a particular project and any subcontracts. This structuring should make it easier for contractors to price a job and give a more accurate tender.

The use of a standard classification system, such as Uniclass 2015, is encouraged as it should remove any potential for confusion or ambiguity.

WHEN ARE SPECIFICATIONS PRODUCED?

The production of specification documents should happen in tandem with design work, with ever greater level of detail added as the design progresses. At tender stage, the specification serves as an essential reference guide for contractors looking to price up a job. Leaving specifications until the last minute – when production information is being prepared – is not to be advised.

The final specification should clearly describe:

- Manufacturer
- Reference
- Framing
- Bracing
- Brackets
- Anchors
- Boards internal
- Boards external
- Fixings
- Vapour barrier
- Insulation
- Cladding
- Workmanship

TYPICAL CLAUSES

- Manufacturer (website, phone, product reference)
- Studs (type, centres)
- Head condition (recycled content)

- Material (recycled content)
- Insulation
- Linings
- Finishing (joint treatment)
- Other requirements
- Fire resistance (maximum height, overall thickness, airborne sound resistance)

It would also be useful, given the variety of ways in which products can be used, to explain the 'execution' – tolerances, cutting/drilling on site, sealing of membranes etc – required to provide specific outcomes/tolerances.

NATIONAL BUILDING SPECIFICATION (NBS)

NBS has a suite of standard templates for the products used in buildings. The products should be defined using Uniclass 2015 when using NBS Create.

UNICLASS 2015

A unified classification for the UK industry covering all construction sectors. It contains consistent tables classifying items of all scale from a facility such as a railway down through to products such as a CCTV camera in a railway station. (https://www.thenbs.com/knowledge/what-is-uniclass-2015).

NBS BUILDING

- G10/150 Steel framing system

NBS CREATE

- 25-15-35/145 Light steel framed wall structure system
- 15-65-75/145 Light steel framing system
- 20-00-75/140 Light steel framed roof structure system

UNICLASS/CHORUS

- Ss-25-10-32-45 Light steel wall framing systems
- Ss-20-10-75-45 Light steel framing systems
- Ss-30-10-30-45 Light steel roof framing systems

STEEL GRADE AND COATINGS

External wall systems perform the significant structural functions of resisting wind load and supporting the weight of cladding systems.

In order to justify the structural design, light steel framing components must be formed from the steel grade specified by the engineer and from materials that conform to BS EN 1090-4. Steels must be appropriate for cold-forming, and suitable steel grades are listed in BS EN 1993-1-3 and BS EN 10346.

To achieve the required durability, steels are coated with a corrosion-resistant finish. SFS components are typically formed from steels with a hot-dip galvanized Z275 zinc coating (275g/m²) in accordance with BS EN 10346.

DEAD WEIGHT OF MASONRY

Masonry cladding, and other similar heavyweight types of cladding, should be supported directly by the primary structure or foundations. Guidance is provided in SCI publication P426: Uninterrupted height of masonry cladding to light steel framing. For stone cladding, the design and installation should follow the guidance provided in BS 8298. In addition to structural requirements, the design of external wall systems must also consider fire resistance, condensation risk, weathertightness, thermal insulation and acoustic performance, and must allow for interfaces at windows, patio doors and balconies and so on.

EXTERNAL FEATURES

The façade of a building may include external features such as porticoes and balconies. The specification of the external walling system should consider the external features of the building, particularly their structural design and method of support.

External features may be supported from the ground and attached to the building for lateral restraint, or they may be supported from the primary structural frame of the building. In some situations, if the external features are lightweight, they may be supported from the external walling system.

The thermal performance of connections to or through the external walling system should be considered in the specification.

CHECKLIST

The designers and specifiers of the external walling should check the following:

STRUCTURAL DESIGN		
Have site-specific loads been provided or calculated (eg wind loads)?	Have all special connection details been specified?	Have all fixing types, including spacing and edge distances, been specified?
Has an erection method statement been provided which clearly shows any special requirements for access?	Is the specification of steel and coating suitable for the relevant environment category class?	

INTERFACES	
Are all interface details clearly shown on the drawings and are special requirements such as isolating gaskets clearly identified?	Where unfamiliar materials are specified, has advice been sought from specialists and have any special requirements been noted on the drawings?

INSTALLATION DRAWINGS	
Is each element appropriately marked (eg manufacturer's name and gauge)?	Do the drawings clearly specify the fixings to be used?

INFILL PANELS		
Are service routes clearly shown on the drawings and have holes been specified through sections where required?	Are requirements for supports to heavily loaded elements clearly shown on the drawings?	Are fixings to primary structure clearly specified?
Have deflection head details been clearly specified with appropriate deflection gaps?	Have setting out assumptions (eg to minimise waste of all lining board) been clearly noted on the drawings?	Have the implications of BR135 16 and the current height rule in AD B2 been addressed?

Designers and specifiers of external walling should expect the following information from the engineers:

THE SPECIFICATION OF FIXING CENTRES AND EDGE DISTANCES OF ANCHORS		
Anchors are fixings that secure the SFS framework to the primary framework, be it steel or concrete.	Anchors in concrete and masonry should be specified in accordance with BS 8539 Code of Practice for the selection and installation of post-installed anchors in concrete and masonry.	The designers and specifiers of the external walling should expect detailed information on the fixings from the SFS system suppliers or board suppliers.

THE SPECIFICATION OF FIXING CENTRES AND EDGE DISTANCES OF BOARD FIXINGS (FASTENERS)
Fixings secure the lining boards and sheathing boards to the SFS framework.

FURTHER CONSIDERATIONS

TOLERANCES

Manufacturing tolerances are defined in the relevant harmonised norm and BS EN 10162.

WORKMANSHIP

The workmanship standards for SFS should be described in the specification and based on BS 8000 standards.

To ensure an acceptable level of quality, a benchmark sample should be built and agreed, then used in toolbox talks to ensure the agreed level is maintained throughout the build. This requirement should be included in the tender package.

MANUFACTURERS' WARRANTIES

Some manufacturers offer system warranties. Where these are required, early engagement with the manufacturers is important to understand the terms and conditions under which a warranty could be offered.

PROJECT PLANNING

Early engagement and communication with the project team to ensure a coordinated approach is a key function to successful delivery.

Where Building Information Modelling/ Management (BIM) is being adopted, manufacturers should be consulted as early in the process as possible to ensure that the formatting, type and level of information and detail of data can be delivered in a timely manner, and that information processes can be followed.

MATERIALS HANDLING

CDM requirements mean designers must ensure that products can be delivered, stored and installed and removed safely.

Note: more information on the safe ingress of boards can be found in the FIS Best Practice Guide - safe ingress of plasterboard.

thefis.org/membership-hub/publications/best-practice-guides/recommendations-for-the-safe-ingress-of-plasterboard/

SUSTAINABILITY

The predicted design life for light steel sections in external wall systems with Z275 coating is 250 years when used within a 'warm-frame' environment. The predicted design life is based on data collected from buildings across Europe and is explained in SCI publication P262 (second edition).

Galvanised steel sections are easily recycled and are 100% recyclable.

Plasterboard is recyclable and can be processed through GRAUKI members.

membe43.wixsite.com/grauki

PEOPLE

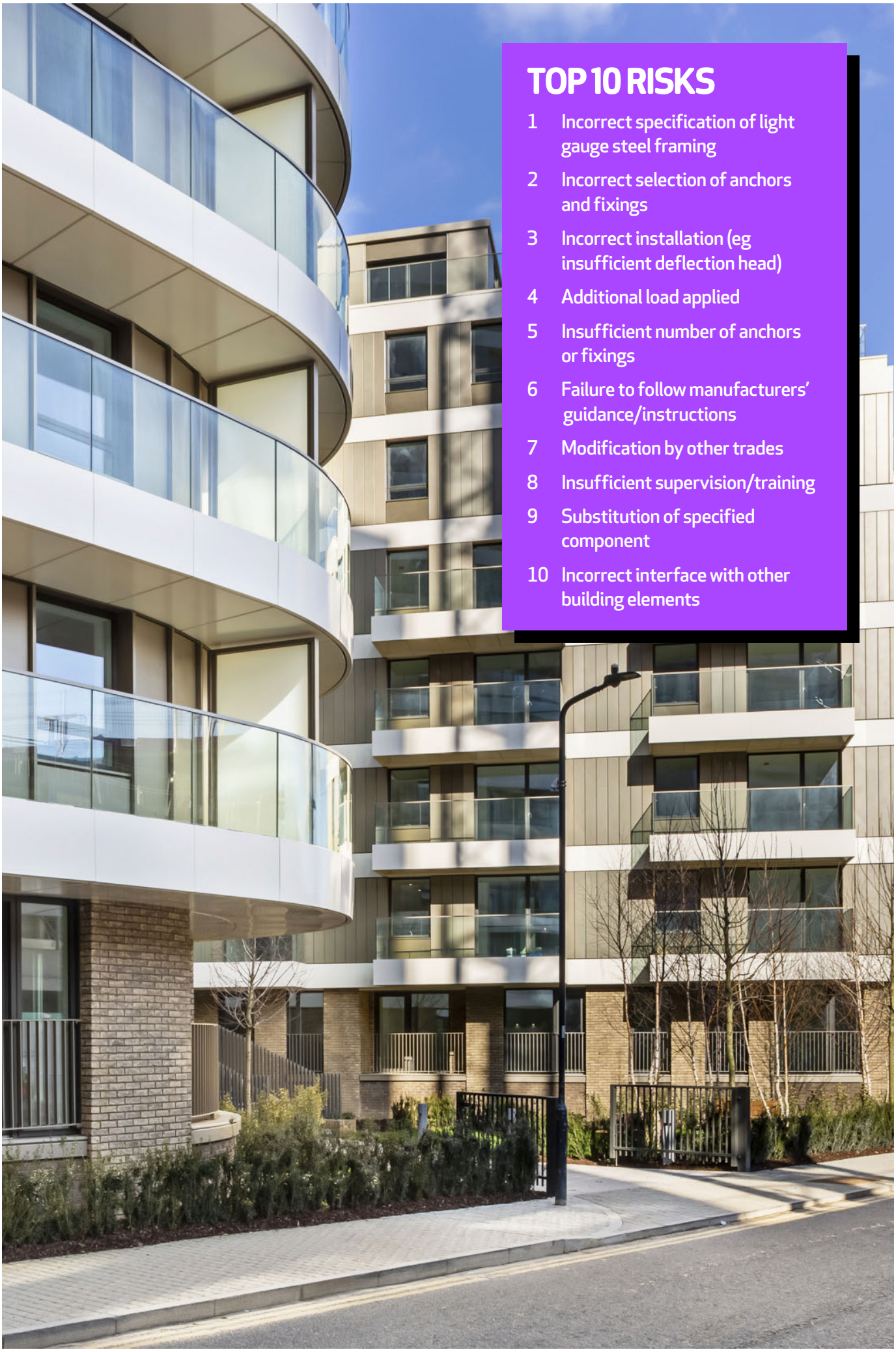
COMPETENCY FRAMEWORK

Light steel external wall systems should be installed by companies that are fully conversant with the system being installed and can demonstrate competency.

The company should provide evidence that their staff are appropriately qualified to a recognised standard. This may be either academic, vocational or experience qualification based on review by an approved assessor. The installers will generally be working as subcontractors to the main contractor who is responsible for the construction of the building.

A competency framework based on Skills, Attitude, Knowledge and Experience (SAKE) was referenced in the CIC Raising the bar report. WG12 has identified that these factors when defined, attained, acknowledged and verified – create a formal framework for product competence.

cic.org.uk/admin/resources/raising-the-barinterimfinal-1.pdf



TOP 10 RISKS

1. Incorrect specification of light gauge steel framing
2. Incorrect selection of anchors and fixings
3. Incorrect installation (eg insufficient deflection head)
4. Additional load applied
5. Insufficient number of anchors or fixings
6. Failure to follow manufacturers' guidance/instructions
7. Modification by other trades
8. Insufficient supervision/training
9. Substitution of specified component
10. Incorrect interface with other building elements

APPENDIX

REFERENCES

1 Building design using cold formed steel sections
Structural design to BS 5950-5: 1998 – section properties and load tables (P276)
SCI, 2002
portal.steel-sci.com/documents.html

2 Technical report: design of light steel sections to Eurocode 3 (ED005)
SCI, 2012
portal.steel-sci.com/documents.html

3 BS EN 10346: 2015
Continuously hot dip coated steel flat products for cold forming. Technical delivery conditions
shop.bsigroup.com/ProductDetail/?pid=000000000030280396

4 Durability of light steel framing in residential building – second edition (P262)
SCI, 2009
portal.steel-sci.com/documents.html

5 BS 5950-5: 1998
Structural use of steelwork in building. Code of practice for design of cold formed thin gauge sections
BSI, 1998
shop.bsigroup.com/ProductDetail/?pid=000000000030155279

6 BS EN 1993-1-3: 2006a
Eurocode 3: Design of steel structures – general rules. Supplementary rules for cold formed members and sheeting (incorporating corrigendum November 2009)
BSI, 2006
shop.bsigroup.com/ProductDetail/?pid=000000000030207055

7 BS EN 1991-1-4: 2005 +A1: 2010
Eurocode 1: Actions on structures. General actions. Wind actions (incorporating corrigenda July 2009 and January 2010)
BSI, 2005
shop.bsigroup.com/ProductDetail/?pid=000000000030206733)

8 Guide to evaluating design wind loads to BS 6399-2: 1997 (P286)
SCI, 2003
portal.steel-sci.com/documents.html

9 Wind actions to BS EN 1991-1-4 (P394)
SCI, 2014
portal.steel-sci.com/documents.html

10 BRE Digest 346: The assessment of wind loads. Part 8: Internal pressures
brebookshop.com/details.jsp?id=326937

11 Building design using cold formed steel sections
Worked examples to BS 5950: Part 5: 1987 (P125)
SCI, 1993
ihsti.com/CIS/document/86042

12 National Structural Steelwork Specification for Building Construction (NSSS)
7th Edition BCSA, 2021
ridba.org.uk/2017/06/27/national-structural-steelwork-specification-building-construction/

13 BS EN 10162: 2003
Cold rolled steel sections. Technical delivery conditions. Dimensional and cross-sectional tolerances.
BSI, 2003
shop.bsigroup.com/ProductDetail/?pid=000000000030016643

14 Manual handling at work – a brief guide
HSE, 2020
hse.gov.uk/pubns/indg143.htm

15 BR 135 – Fire performance of external thermal insulation for walls of multistorey buildings – third edition
BRE, 2013
brebookshop.com/details.jsp?id=327137

16 Approved Document B (Fire safety) – Volume 1: Dwellings (2019 edition)
planningportal.co.uk/info/200135/approved_documents/63/part_b_-_fire_safety/

17 Technical Report ED017: Design and installation of light steel external wall systems
thefis.org/membership-hub/publications/sfs-guide/

18 Best Practice Guide: Recommendations for the safe ingress of plasterboard
thefis.org/membership-hub/publications/best-practice-guides/recommendations-for-the-safe-ingress-of-plasterboard/

19 The Centre for Window and Cladding Technology (CWCT)
cwct.co.uk/pages/publications

APPENDIX

STANDARDS

BS 476-21:1987
Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction.

BS 476-22:1987
Fire tests on building materials and structures. Method for determination of the fire resistance of non-loadbearing elements of construction.

BS 476-23:1987
Fire tests on building materials and structures. Methods for determination of the contribution of components to the fire resistance of a structure.

BS 5250:2011+A1:2016
Provides dedicated guidance on vapour transfer, ventilation etc. for the structural forms highlighted.

BS 8414-1:2020
Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems fixed to, and supported by, a masonry substrate.

BS 8539:2012+A1:2021
Code of practice for the selection and installation of post-installed anchors in concrete and masonry.

BS EN 1090-1:2009+A1:2011
Execution of steel structures and aluminium structures. Requirements for conformity assessment of structural components.

BS EN 12664:2001
Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Dry and moist products of medium and low thermal resistance.

BS EN 12667:2001
Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance.

BS EN 12939:2001
Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Thick products of high and medium thermal resistance.

BS EN ISO 10140-2:2010
Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation.

BS EN 14190:2014
Gypsum board products from reprocessing. Definitions, requirements and test methods.

BS EN 15804:2012+A1:2013
Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

BS EN 1991-1-4:2005+A1:2010
Eurocode 1: Actions on structures. General actions. Wind actions.

BS EN 1996-1-1:2005+A1:2012
Eurocode 6. Design of masonry structures. General rules for reinforced and unreinforced masonry structures.

BS EN 520:2004+A1:2009
Gypsum plasterboards. Definitions, requirements and test methods.

BS EN 717-1:2004
Wood-based panels. Determination of formaldehyde release. Formaldehyde emission by the chamber method.

BS EN 13501-1:2018
Fire classification of construction products and building elements. Classification using data from reaction to fire tests.

BS EN 1090-4:2018
Execution of steel structures and aluminium structures. Technical requirements for cold-formed structural steel elements and cold-formed structures for roof, ceiling, floor and wall applications.

APPENDIX

BS EN 13381-8:2013
Test methods for determining the contribution to the fire resistance of structural members. Applied reactive protection to steel members.

BS EN 1365-2:2000
Fire resistance tests for loadbearing elements. Floors and roof.

ISO 14025
Environmental labels and declarations – type iii environmental declarations – principles and procedures.

BUILDING REGULATIONS

The Building Regulations should be consulted during this specification process, and the guidance in the approved documents followed.

APPROVED DOCUMENTS (AD)

Part A - Structure
www.planningportal.co.uk/info/200135/approved_documents/62/part_a_-_structure

Part B - Fire Safety
www.planningportal.co.uk/info/200135/approved_documents/63/part_b_-_fire_safety

Part C - Site preparation and resistance to contaminants and moisture
www.planningportal.co.uk/info/200135/approved_documents/65/part_c_-_site_preparation_and_resistance_to_contaminates_and_moisture

Part D - Toxic Substances
www.planningportal.co.uk/info/200135/approved_documents/66/part_d_-_toxic_substances

Part E - Resistance to the passage of sound
www.planningportal.co.uk/info/200135/approved_documents/67/part_e_-_resistance_to_the_passage_of_sound

Part F - Ventilation
www.planningportal.co.uk/info/200135/approved_documents/68/part_f_-_ventilation

Part K - Protection from falling, collision and impact
www.planningportal.co.uk/info/200135/approved_documents/73/part_k_-_protection_from_falling_collision_and_impact

Part L - Conservation of fuel and power
www.planningportal.co.uk/info/200135/approved_documents/74/part_l_-_conservation_of_fuel_and_power

Part M - Access to and use of buildings
www.planningportal.co.uk/info/200135/approved_documents/80/part_m_-_access_to_and_use_of_buildings

Part P - Electrical Safety
www.planningportal.co.uk/info/200135/approved_documents/82/part_p_-_electrical_safety

Part Q - Security
www.planningportal.co.uk/info/200135/approved_documents/83/part_q_-_security

Regulation 7 - Materials and workmanship
www.planningportal.co.uk/info/200135/approved_documents/84/regulation_7_-_materials_and_workmanship

OTHER GUIDANCE

The ASFP, BESA, BSRIA, FIS and GPDA document Firestopping of Service Penetrations: Best Practice in Design and Installation
thefis.org/membership-hub/publications/best-practice-guides/firestopping-of-service-penetrations/

BEST PRACTICE GUIDES

SCI/FIS ED017
thefis.org/membership-hub/publications/sfs-guide/

SCI Guides
portal.steel-sci.com/shop.html

FINISHES & INTERIORS SECTOR

SCI
Steel Knowledge

SPECIFIERS' GUIDE

LIGHT GAUGE STEEL FRAMING SYSTEMS (SFS) EXTERNAL WALL SYSTEMS

FIS
Olton Bridge
245 Warwick Road
Solihull
West Midlands
B92 7AH

+44(0)121 707 0077
info@thefis.org
thefis.org

SCI
Silwood Park
Ascot
Berkshire
SL5 7QN

+44(0)1344 636 525

steel-sci.org